

FEATURE

- AEC-Q200 qualified.
- Superior anti-surge voltage performance
- High stability and reliability
- Superior high-power performance
- RoHS compliant.
- Superior anti-sulfur performance
- Compatible with reflow and wave soldering type
- Applications:
 - Automotive electronics
 - Communication devices
 - Computer, notebook, workstation, tablet, and peripherals
 - Home appliances
 - Medical devices
 - Industrial control system
 - etc.

MANUFACTURER PART NO.

For example: AN0805J100RT5G00-AN0805 ±5% 100Ω T/R-5000

Series	Size	Tol.	Nominal Resistance Value	PKG	SPQ	Feature	TCR
2 codes	4 codes	1 code	2-5 codes	1 code	1 code	1 code	2 codes
AN	0805	J	100R	T	5	G	00
Automotive Grade Anti-Surge Thick Film Chip Resistors	0402 0603 0805 1206 1210 2010 2512	J=±5% K=±10% M=±20%	1R ^① =1Ω 4R7=4.7Ω 4K7 ^② =4.7KΩ 100K=100KΩ 4M7 ^③ =4.7MΩ	T=T/R ^④	4=4K 5=5K A=10K	G=Std. S=P.C. ^⑤	00=Refer to table as below.

Note: ① R=Radix, 10⁰, Ω

② K=Kilo, 10³, KΩ

③ M=Mega, 10⁶, MΩ

④ T/R=Taping in Reel packing type

⑤ P.C.=Personal and Customized.

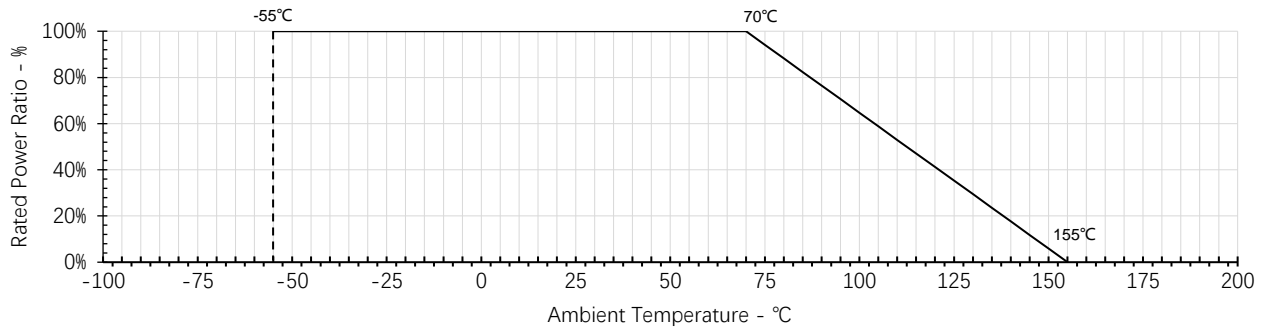
CHARACTERISTICS

Type	Rated Power	MWV ^①	MOV ^②	Tolerance	Value Range
AN0402	1/8W	50V	100V	±5%, ±10%, ±20%	1Ω~10M
AN0603	1/4W	75V	150V	±5%, ±10%, ±20%	1Ω~10M
AN0805	1/2W	150V	300V	±5%, ±10%, ±20%	1Ω~10M
AN1206	0.6W	200V	400V	±5%, ±10%, ±20%	1Ω~10M
AN1210	3/4W	200V	500V	±5%, ±10%, ±20%	1Ω~10M
AN2010	1.5W	400V	800V	±5%, ±10%, ±20%	1Ω~10M
AN2512	2W	500V	1000V	±5%, ±10%, ±20%	1Ω~10M

Note: ① MWV: Max. Working Voltage

② MOV: Max. Overload Voltage

POWER DERATING CURVE



Note: Operating Temperature Range: -55°C~+155°C

RATED VOLTAGE

Resistors should have a Rated Voltage DC or AC corresponding to Rated Power which can be calculated by formula as below.

The Rated Voltage of certain resistance value should be the calculated result or Max. Working Voltage of product series whichever less.

Formula:

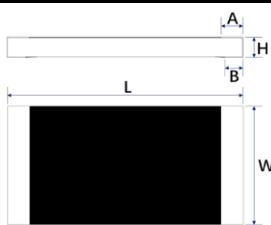
$$E = \sqrt{P \times R}$$

E=Rated voltage(V)

P=Rated power(W)

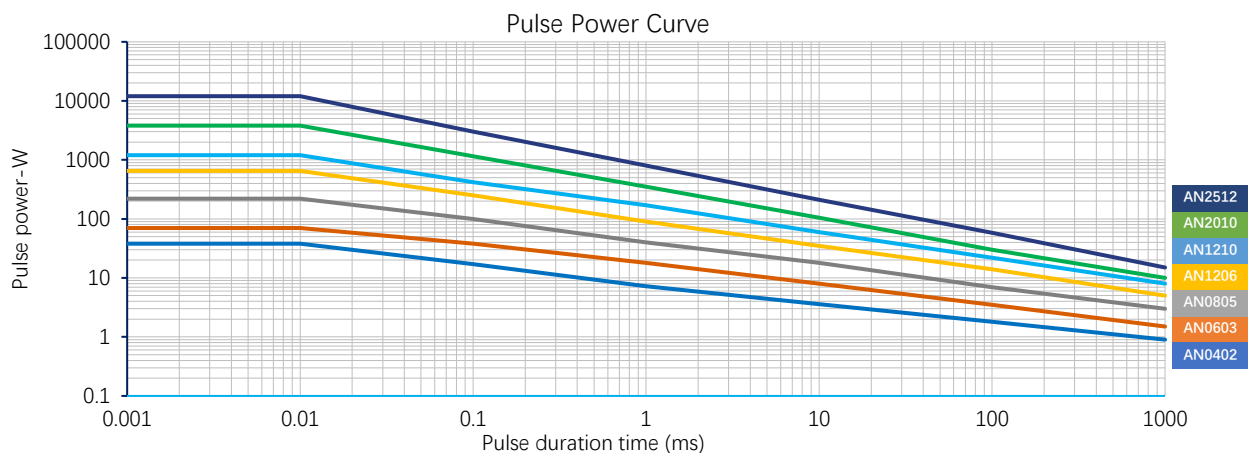
R=Nominal resistance(Ω)

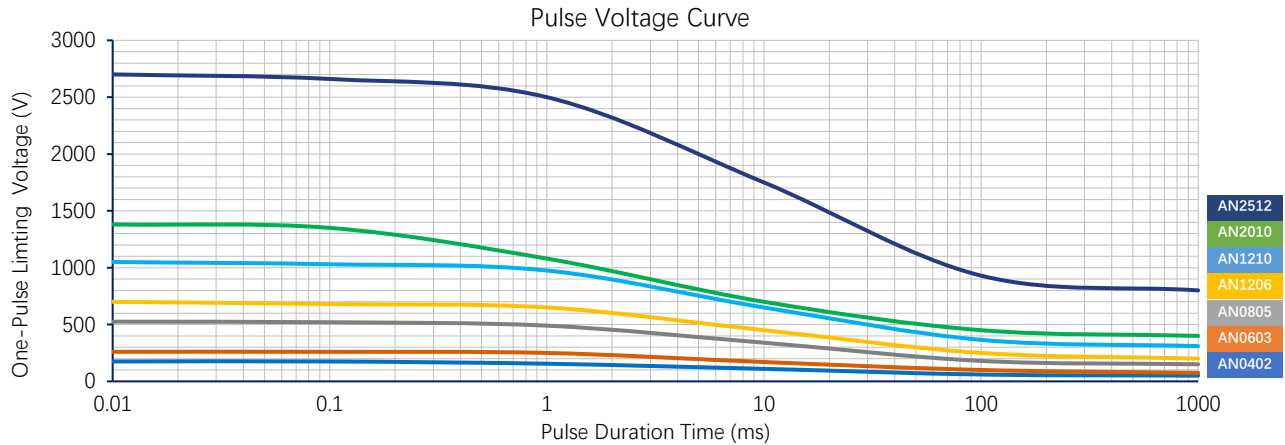
DIMENSIONS

Figure	Type	L	W	H	A	B
	AN0402	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
	AN0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
	AN0805	2.00±0.15	1.25±0.15	0.55±0.10	0.40±0.20	0.40±0.20
	AN1206	3.10±0.15	1.55±0.15	0.55±0.10	0.45±0.20	0.45±0.20
	AN1210	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20
	AN2010	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20
	AN2512	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20

Unit: mm

SINGLE PULSE DURATION CURVE





RELIABILITY

Item	Test Method	Acceptable Criterion								
High Temperature Exposure	+155°C, 1000hrs., unpowered, measure the resistance change rate after test. Reference: AEC-Q200 Test 3, MIL-STD-202 Method 108	ΔR/R= ±1.0%								
Temperature Cycling	-55~+125°C, slope 10~20°C/min, dwell time 15min, 1000 cycles Reference: AEC-Q200 Test 4, JESD22 Method JA-104	ΔR/R=±2.0%								
Biased Humidity	85°C, 85%RH, load 10% rated power, 1000hrs., take it out and stabilized 24 hrs. then measure the change rate of resistance value Reference: AEC-Q200 TEST 7, MIL-STD-202 Method 103	ΔR/R=±2.0%								
Operational Life	125°C, rated voltage (calculated according to derating curve), 1000 hrs., with cycle 90 min ON, 30 min OFF Reference: AEC-Q200 Test 8, MIL-STD -202 Method 108	ΔR/R=±2.0%								
Resistance to Solvent	Immerse in isopropanol solvent at room temperature (23±5°C) for 5min, wipe 10 times with a hard toothbrush, repeat 3 times, take out and blow dry for examination Reference: AEC-Q200 Test 12, MIL-STD-202 Method 215	No visible damage								
Resistance to Soldering Heat	Soak in a tin furnace at 260 ⁺⁵ ₋₀ °C for 10 ⁺¹ ₋₀ seconds, take out and stand for more than 60 minutes, then measure the change rate of resistance value. Reference: AEC-Q200 TEST 15, MIL-STD-202 Method 210	ΔR/R=±1.0%								
ESD	Human body mode, two discharges, positive and negative polarity once each <table border="1" style="margin-left: 20px;"> <tr> <td>Size</td> <td>0402,0603</td> <td>0805 and above</td> </tr> <tr> <td>Test Voltage</td> <td>1000V</td> <td>2000V</td> </tr> </table> Reference: AEC-Q200 Test 17, AEC-Q200-002	Size	0402,0603	0805 and above	Test Voltage	1000V	2000V	ΔR/R=±2.0%		
Size	0402,0603	0805 and above								
Test Voltage	1000V	2000V								
Solderability	Pretreatment: dry heat 155°C, 4 hrs. or PCT aging for 4 hrs. (equivalent), after take out, stand at room temperature for 2 hrs. Test method: 1. Dip the resistance in a tin furnace at 245±3°C for 3 seconds, then take it out and observe the solder area under a microscope; 2. Reflow soldering test, Peak Temperature: 235°C, T=40± 5 seconds. Reference: AEC-Q200 Test 18, J-STD-002 & IEC 60115-1 11.1.4.3	Soldering coverage must be 95% minimum. At the edge of terminal, the object underneath (e.g., white ceramic) shall not expose.								
Electrical Characterization	$TCR(PPM/°C) = \frac{R_2 - R_1}{R_1 \times (T_2 - T_1)} \times 10^6$ R_1 : Resistance value tested at room temperature (Ω) R_2 : Resistance value tested at -55°C or +125°C T_1 : Temperature at room temperature (°C) T_2 : Temperature at -55°C or +125°C Reference: AEC-Q200 Test 19, IEC 60115-1 6.2	1Ω ≤ R ≤ 10Ω: ±200PPM/°C > 10Ω: ±100PPM/°C								
Board Flex	The SMD resistance was welded to the test board and bent with the standard pressure block. After standing for 60s under the corresponding deformation condition, the change rate of resistance value of the part was tested. <table border="1" style="margin-left: 20px;"> <tr> <td>Size</td> <td>0402,0603, 0805</td> <td>1206, 1210</td> <td>2010, 2512</td> </tr> <tr> <td>Depth</td> <td>5mm</td> <td>3mm</td> <td>2mm</td> </tr> </table> Reference: AEC-Q200 TEST 21, AEC-Q200-005	Size	0402,0603, 0805	1206, 1210	2010, 2512	Depth	5mm	3mm	2mm	ΔR/R=±1.0%
Size	0402,0603, 0805	1206, 1210	2010, 2512							
Depth	5mm	3mm	2mm							

AN Series

Automotive Grade Anti-Surge Thick Film Chip Resistors

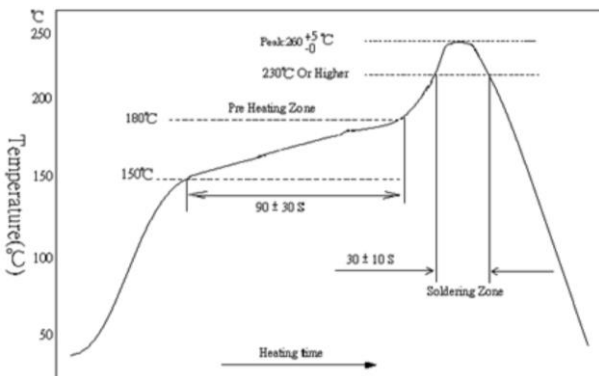
Version. B



Item	Test Method	Acceptable Criterion
Terminal Strength	Apply 1.8Kgf. external force (0402,1 Kgf.) on the side of the part to test the solder joint adhesion of the part Reference: AEC Q200-005	No mechanical damage or peel-off of side end
Short Time Overload	Apply 2.5 times rated voltage or maximum overload voltage (whichever is the smallest) for 5 seconds. Reference: IEC 60115-1 8.1.4.2	$\Delta R/R = \pm 1.0\%$
Mechanical shock	Half sine wave, acceleration 100g's, each three times in X, Y and Z directions, pulse width 6ms. Reference: AEC-Q200 Test 13, MIL-STD -202 Method 213	$\Delta R/R = \pm 1.0\%$
Vibration	Frequency: 10Hz~2000Hz, acceleration: 5g's, X, Y, Z three directions, 12 cycles in each direction, a total of 36 cycles, a single cycle test for 20min. Reference: AEC-Q200 Test 14, MIL-STD -202 Method 204	$\Delta R/R = \pm 1.0\%$
Flammability	V-0 Reference: AEC-Q200 Test 20, UL-94	Do not burn and cotton below do not ignite
Flame retardancy	9V _{DC} to 32V _{DC} (clamp current 500A) in each increment 1V _{DC} for 1 hr. Reference: AEC-Q200 Test 24, AEC-Q200-001	1. Nonflammable 2. Do not explode 3. The temperature cannot be higher than 350°C for 10 seconds
Sulfide test	Put the test sample resistor in sulfur vapor, at a temperature of 105±2°C for 750hrs Reference: ASTM-B-809-95&EIA977	$\Delta R/R = \pm 4.0\%$

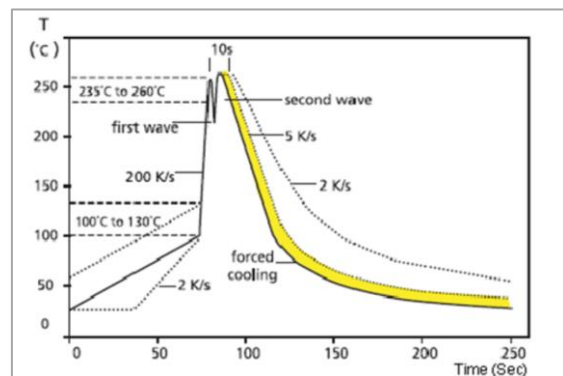
SOLDERING

Lead Free IR Reflow Soldering Profile



- Top temperature should be under 260 +5/-0 °C ,10Sec.
- Reference: J-STD-020D

Lead Free Double-Wave Soldering Profile



- Suitable for 0603 above size products
- 350±10°C within 3 Sec. if soldering iron.

SOLDERING PAD

Figure	Type	Unit: mm		
		A	B	C
	AN0402	0.5	1.5	0.6
	AN0603	0.8	2.1	0.9
	AN0805	1.2	3.0	1.3
	AN1206	2.2	4.2	1.6
	AN1210	2.2	4.2	2.8
	AN2010	3.5	6.1	2.8
	AN2512	3.8	8.0	3.5

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AN Series

Automotive Grade Anti-Surge Thick Film Chip Resistors

Version. B



WORKING ENVIRONMENT

If user intends to use products in special environments or states (including but not limited to the following), it is necessary to approve special characteristics and reliability for the following or other application environments.

- A. High temperature.
- B. Near the sea, or corrosive gas, such as Cl₂, H₂S, NH₃, SO₂ and NO₂, etc.
- C. Unverified liquids, such as water, oil, chemical or organic solvent.
- D. Unverified resin or paint to cover products.
- E. Products should be washed with water soluble cleaner even if non cleaning flux.

STORAGE / CARRY CONDITIONS

- A. Temperature: 25±5°C
- B. Humidity: 60±15%RH
- C. Storage life: 2 years. FIFO
- D. Please hold box correct orientation when storing and carrying. It is strictly prohibited to fall or squeeze the box, otherwise the product electrode or body may be damaged.

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